

REMARKS

Claims 1-2, 7-8, 17-22 and 25-31 are present in the application. Of these, dependent Claim 29 is presently withdrawn from examination (as directed to the non-elected species of Figure 1), but Claim 29 will again become subject to examination in this application in the event of allowance of its generic independent claim (Claim 25). In view of the remarks which follow, reconsideration of this application is respectfully requested.

Telephone Conference with Examiner Atkinson

This will make of record a telephone conference between the undersigned and Examiner Atkinson on January 17, 2002, regarding the pending Office Action. The undersigned pointed out that the pending Office Action is at least the third Office Action which makes the factually incorrect statement that the non-elected species of Figure 1 "is abandoned per the Board of Appeals Decision". The undersigned noted that Applicants have filed two prior Responses which explain in detail why this statement is not factually correct. The Examiner indicated that he would not continue to maintain this position. The undersigned and the Examiner also discussed the pending rejection which is based on the first paragraph of 35 U.S.C. §112, but no agreement was reached.

Objection to Specification

The Office Action raised an objection to the specification under 35 U.S.C. §132, asserting that new matter was introduced into page 7 of the specification by the Amendment which was filed on September 25, 2000. In this regard, the attention of the Examiner is respectfully directed to MPEP §2163.07(a), which states that:

By disclosing in a patent application a device that inherently performs a function or has a property, operates according to a theory or has an advantage, a patent application necessarily discloses that function, theory or advantage, even though it says nothing explicit concerning it. The application may later be amended to recite the function, theory or advantage without introducing prohibited new matter. (Emphasis added).

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It is respectfully submitted that the material added on page 7 of the present application represents an amendment of the type specifically permitted by MPEP 2163.07(a), rather than the introduction of any new matter into the disclosure of the invention. More specifically, and with reference to the originally-filed application papers, pages 7-8 explain that the respective embodiments disclosed in Figures 1 and 2 each use paraffin as a phase change material. The specification further explains that, in these embodiments, the paraffin phase change material shifts between solid and liquid phases. In addition, the present application indicates that the available space within the cavity can be fully filled with the paraffin phase change material. Persons skilled in the art will readily recognize paraffin has certain inherent characteristics such that, when it fully fills the space within a cavity and is in a solid phase, there is no appreciable movement of the paraffin within the cavity. Such persons will also readily recognize that, even when the same paraffin changes to its liquid phase, it will be free of any

substantial movement within the cavity. Persons skilled in the art will also recognize from the originally-filed disclosure that no movement of the paraffin within the chamber is needed for proper operation of the disclosed embodiments. Consequently, it is respectfully submitted that the text added by amendment on page 7 of the specification contains only information which is already inherent in the original disclosure, and is thus an amendment of the type specifically permitted MPEP §2163.07(a). It is therefore respectfully submitted that the amendment to page 7 of the specification does not introduce any new matter into the disclosure of the invention. Consequently, it is respectfully submitted that the objection under 35 U.S.C. §132 is wrong, because no new matter has been added by amendment, and notice to that effect is respectfully requested. (Applicants wish to add that the foregoing discussion of certain disclosed embodiments is provided by way of example to demonstrate that no new matter has been added, and is not intended to suggest any limitation to the scope of any pending claim).

Claims 26 and 31

The Office Action rejected each of dependent Claims 26 and 31 under the first paragraph of 35 U.S.C. §112, asserting that they recite subject matter which was not disclosed in the originally-filed application papers. The Office Action also made a related objection to the specification under 35 C.F.R. §1.71, asserting that the originally-filed specification does not disclose the subject matter of Claims 26 and 31. These grounds of rejection and objection are respectfully traversed, for the following reasons.

Claims 26 and 31 each recite that "said phase change material is free of substantial movement within said cavity".

Claims 26 and 31 respectively depend from independent Claims 25 and 30. The Office Action concedes (in the middle of page 7) that the originally-filed specification teaches on page 7 that, with regard to the non-elected embodiment of Figure 1, the phase change material can fully fill the voids in the porous material within the cavity. Persons skilled in the art will be readily recognize that, when these voids are fully filled by the phase change material, the "phase change material is free of substantial movement within said cavity" (as recited in Claims 26 and 31), regardless of whether the phase change material is in a solid state or a liquid state. Consequently, the subject matter of Claims 26 and 31 is present in and supported by the embodiment of Figure 1 (as disclosed in the originally-filed application papers). Thus, the originally-filed specification does in fact disclose the subject matter recited in Claims 26 and 31. It is therefore respectfully submitted that the rejection under the first paragraph of §112 and the objection under 37 CFR §1.71 are each incorrect, and must be withdrawn.

Certain other statements made in the Office Action do not change this. For example, page 7 of the Office Action asserts that Claims 26 and 31 "do not read on the embodiment of Figure 1 since this non-elected species is abandoned per the Board of Appeals Decision". As discussed above, the undersigned and the Examiner discussed this statement in a telephone conference, and the Examiner agreed not to maintain this position (because it is directly inconsistent with the actual Board of Appeals Decision, which addressed Figure 2 and said nothing about Figure 1). Moreover, both the §112 rejection and the §1.71 objection depend on what was present in the application papers at the time they were originally filed, and it is thus irrelevant whether or not the embodiment of Figure 1 may have been abandoned at some later point in

time. In other words, since Claims 26 and 31 each read onto and are supported by the disclosure of the embodiment of Figure 1 in the originally-filed application papers, the requirements of 35 U.S.C. §112 and 37 C.F.R. §1.71 are met, without regard to whether or not there may have been any subsequent abandonment of Figure 1.

The Office Action also asserts on page 7 that the originally-filed application did not disclose that the cavity in the elected embodiment of Figure 2 could be fully filled with a phase change material. Applicants believe that Figure 2 does disclose this feature, but Applicants also note that the presence or absence of this feature in the embodiment of Figure 2 is irrelevant to the §112 rejection and the §1.71 rejection. In particular, so long as Claims 26 and 31 each read onto and are supported by the disclosure of Figure 1 in the originally-filed application papers, the requirements of §1.71 are satisfied, and the first paragraph of §112 are also satisfied. As to Figure 2, if the Examiner believed that Claims 26 and 31 did not read onto the elected embodiment of Figure 2, it might have been possible for the Examiner to withdraw Claims 26 and 31 from examination on the ground that they are not drawn to the elected invention. However, the pending Office Action does in fact address Claims 26 and 31 on the merits, which necessarily represents a determination that they each do read onto the elected embodiment of Figure 2.

Applicants note that, in order to withdraw Claims 26 and 31 from examination, it would be necessary for the Examiner to withdraw the pending final rejection and then issue a further non-final Office Action. However, since the sentence at lines 7-10 on page 7 of the originally-filed specification indicates that the phase change material in the embodiment of Figure 1 is entered into the cavity so as to "partially or fully fill" the remainder of the cavity (i.e.

the portion of the cavity not taken up by the porous material), and since the sentence bridging pages 7-8 of the specification states that the phase change material in the embodiment of Figure 2 is "entered into the cavity as in the first embodiment" (or in other words so as to "partially or fully fill the remainder of the cavity"), it is respectfully submitted that Figure 2 includes the subject matter of Claims 26 and 31, and that it would be improper to withdraw Claims 26 and 31 from examination.

Claims 25 and 30

Independent Claims 25 and 30 each stand rejected under 35 U.S.C. §102 as anticipated by Telkes U.S. Patent No. 2,677,367. This ground of rejection is respectfully traversed, for the following reasons. With respect to when a claim is anticipated under §102, the Court of Appeals for the Federal Circuit has consistently held that: "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed.Cir. 1987). Similarly, "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed.Cir. 1989). MPEP §2131 cites these two cases for precisely the same principle that they are cited here, and in fact quotes the same language from these cases which has been quoted above.

In the present application, independent Claim 25 includes a recitation of a thermally conductive porous material which is within the cavity, and which is "coupled physically and thermally to said highly thermally conductive portion of said enclosure". Independent Claim 30 includes a

similar limitation. In lines 6-7 on page 6, the Office Action asserts that, since Telkes states his disclosed matrix "will not settle to the bottom" of a cavity in an enclosure, the matrix of Telkes is coupled physically to the wall. This quoted phrase appears in the sentence at lines 43-46 of column 4 in Telkes, and it is respectfully submitted that the Office Action takes this quoted phrase out of context. In particular, Telkes states in this sentence that the reason the matrix "will not settle to the bottom" of the cavity is that the matrix "extends substantially throughout the interior of the container", and not because there is any physical coupling of the matrix to the wall of the cavity (as asserted in the Office Action). Telkes therefore does not anticipate the subject matter of Claims 25 and 30 under §102, because Telkes fails to disclose one of the elements expressly recited in each of these claims, and thus fails to satisfy the strict requirement that it disclose "each and every" element recited in each of these claims. Claims 25 and 30 are therefore believed to be allowable over Telkes, and notice to that effect is respectfully requested.

Claim 1

Independent Claim 1 stands rejected under 35 U.S.C. §103 as obvious in view of a combination of teachings from the Telkes patent, and newly-cited Voorhes U.S. Patent No. 5,390,734. This ground of rejection is respectfully traversed, for the following reasons. Claim 1 is directed to a heat sink which includes an enclosure defining a cavity, and a phase change material disposed within the cavity. Claim 1 recites that the enclosure has "a highly thermally conductive portion composed of a composite of highly thermally conductive fibers disposed in a matrix; . . . a plurality of said fibers extending externally of said matrix and into said cavity to

provide a porous, highly thermally conductive material integral with and thermally coupled to said highly thermally conductive portion". Claim 1 adds that the phase change material is "disposed in said porous material in said cavity".

The Telkes patent discloses in Figure 4 a heat storage unit 12 which stores heat by using a chemical such as disodium orthophosphate to absorb heat as the chemical changes from a solid to a liquid. Telkes uses this chemical due to its high latent heat of fusion. However, when this chemical freezes, it can crystallize into either of at least two different hydrates, for example as discussed at line 45 in column 1 of Telkes. Telkes teaches that, for proper operation, it is desirable for the liquid chemical to crystallize or freeze into one specific type of hydrate, and to do so predictably. According, Telkes uses a "crystal promoter" structure in order to ensure that the desired hydrate will crystallize, and that the undesired hydrates will not crystallize. The crystal promoter structure may be either cellular glass or glass wool, as respectively discussed at line 32 of column 3, and line 23 of column 4. The crystal promoter is disposed in the housing cavity and has a size and shape comparable to that of the cavity, but the crystal promoter is not attached to any of the walls of the cavity (for example as noted at lines 43-46 of column 4). Telkes does not teach or suggest that the cellular glass or glass wool is highly thermally conductive. In fact, Telkes does not appear to include anything which teaches or suggests that thermal conductivity would be desirable or provide any useful benefit. Instead, Telkes emphasizes that the intended function of the cellular glass or glass wool is to promote certain crystal growth.

Thus, Telkes clearly fails to teach or suggest an enclosure which has a highly thermally conductive portion



composed of a composite of highly thermally conductive fibers disposed in a matrix, where a plurality of the fibers extend externally of the matrix and into the cavity in the enclosure in order to provide a porous and highly thermally conductive material within which the phase change material is disposed. Consequently, since Telkes does not disclose these features, the issue is whether the Voorhes patent does. It is respectfully submitted that Voorhes does not disclose these features.

More specifically, the Office Action relies on Figure 11d of Voorhes, which discloses a plurality of parallel and spaced graphite fibers 74 that are thermally conductive, and that each have an upper end embedded in a block 75 which is made of an adhesive material. The Office Action asserts that it would be obvious to modify the Telkes apparatus so as to incorporate into it the device which is shown in Figure 11d of Voorhes. In particular, the Office Action postulates it would be obvious that the block 75 could be a portion of the wall of Telkes, and that the fibers 74 could be disposed in the cavity of Telkes. However, Applicants respectfully submit that this would not be obvious, for the following reasons.

First, it should be noted that Figures 11a through 11e of Voorhes show various successive steps in a process for making the device which is shown in Figure 11e. Consequently, the device shown in Figure 11d of Voorhes is not any kind of final product, but represents merely an intermediate step in the overall process of making the device shown in Figure 11e. In other words, Voorhes does not teach or even suggest that the device of Figure 11d is capable of any useful operation by itself, in the specific form which is shown in Figure 11d. To the contrary, Voorhes teaches that further changes are needed in the device of Figure 11d, in order to reach the final configuration which is shown in Figure 11e. Consequently, it

is respectfully submitted that a person of ordinary skill in the art would have absolutely no inclination to take the device shown in Figure 11d of Voorhes and view it as a final operational configuration which could be incorporated into some other type device. In fact, Voorhes effectively teaches away from this. Consequently, it would not be an obvious matter to take the incomplete and partially fabricated device shown in Figure 11d of Voorhes, and incorporate it into the Telkes apparatus.

A second consideration is that a person of ordinary skill in the art would have no motivation to attempt to combine Telkes and Voorhes in the first place. In this regard, and as discussed above, Telkes provides a porous material within an enclosure for a very specific purpose, namely for controlling the type of crystallization which occurs within a phase change material. This has nothing at all to do with thermal conductivity. In contrast, Voorhes deals with thermal conductivity but has no teachings on techniques for controlling crystallization, and certainly does not teach or suggest that the device of Figure 11d (or any other disclosed device) would be of any benefit in achieving control over any type of crystallization process, much less the specific crystallization process involved in the Telkes device. It would therefore not be obvious to replace the porous material of Telkes (which was specifically selected for its operational characteristics in controlling crystallization) with any of the structure shown in Voorhes, because Voorhes does not teach or suggest that any structure disclosed therein would have any beneficial characteristic with respect to controlling any crystallization process.

The pending rejection under §103 is not based on Figure 11e of Telkes. However, for purposes of completeness, and in order to expedite examination of the present

application, a brief comment is offered regarding Figure 11e. In particular, Voorhes teaches that, as to the portions of the fibers 74 which are outside the block 75, these fiber portions are to be drawn together as tightly as possible, in order to form a tightly packed bundle 77 of these fibers. The splay region 73 is configured to effect the transition from the block 75 to the bundle 77 in the shortest possible distance. The bundle 77 is clearly not a "porous" arrangement which can have a phase change material disposed therein. Thus, with reference to Figure 11e, the teachings of Voorhes run directly contrary to the teachings of the present invention. In particular, Claim 1 recites fibers that extend out of a thermally conductive portion of an enclosure and serve as a material which is sufficiently "porous" so that a phase change material can be present within the porous material. In contrast, Voorhes teaches that the portions of the fibers outside the block 75 are to be packed as tightly as possible (as shown at 77 in Figure 11e), such that the result could not even remotely be considered a "porous" material, much less a porous material that can have a phase change material disposed therein. Thus, even if Telkes was modified in light of the device shown in Figure 11e of Voorhes, the result would not be the subject matter recited in Claim 1, because Voorhes teaches directly away from a significant and distinctive characteristic of the subject matter of Claim 1.

On page 6, the Office Action suggests that Applicants have improperly attempted to show non-obviousness by attacking the references of this combination individually, without addressing the combination. However, this statement misinterprets Applicants' arguments. In particular, it is true that Applicants have discussed Telkes and Voorhes individually, but Applicants always go on to also discuss Telkes and Voorhes in combination. In this regard, and given

that Telkes and Voorhes each fail to individually disclose distinctive features which are recited in Claim 1, Telkes and Voorhes necessarily fail to disclose those features when considered in combination.

In the paragraph bridging pages 6-7, the Office Action addresses motivation, and in particular asserts that a person of ordinary skill in the art would be motivated to modify the enclosure/wall of Telkes in view of Voorhes, for the purpose increasing the thermal conductivity of the wall. However, the distinctive language from Claim 1 which is quoted above recites more than just a highly thermally conductive portion of an enclosure. Claim 1 recites that a cavity within the enclosure contains a porous material which is highly thermally conductive, and which is thermally coupled to the highly thermally conductive portion of the enclosure. The discussion of motivation in the Office Action contains nothing that would establish motivation to (1) make the porous material of Telkes highly thermally conductive, or (2) physically and thermally couple this porous material to a portion of the enclosure. Thus, the Office Action fails to establish the motivation required by §103 with respect to the distinctive features which are emphasized in the portion of Claim 1 quoted above.

For the reasons set forth above, it is respectfully submitted that it would not be obvious to combine the teachings of Telkes and Voorhes in the first place, and that even if teachings from Telkes and Voorhes were combined, the result would not be a device of the type recited in Claim 1. It is therefore respectfully submitted that Telkes and Voorhes do not, separately or in combination, render obvious the subject matter recited in independent Claim 1 of the present application. Claim 1 is therefore believed to be allowable, and notice to that effect is respectfully requested.

Dependent Claims

Claims 2, 7-8 and 17-22 depend from Claim 1, and are also believed to be allowable over the art of record, for example for the same reasons discussed above with respect to Claim 1. Similarly, Claims 26-28 and Claim 31 respectively depend from Claim 25 and Claim 30, and are also believed to be allowable over the art of record, for example for the same reasons discussed above with respect to Claims 25 and 30.

Conclusion

Based on the foregoing, it is respectfully submitted that all of the pending claims are fully allowable, and favorable reconsideration of this application is therefore respectfully requested. If the Examiner believes that examination of the present application may be advanced in any way by a telephone conference, the Examiner is invited to telephone the undersigned attorney at (214) 953-6684.

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Although Applicants believe that no additional fees are due, the Commissioner is hereby authorized to charge any fees required by this paper, or to credit any overpayment, to Deposit Account No. 02-0384 of Baker Botts L.L.P.

Respectfully submitted,  
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